CLAIMS

1. A hydrodynamic stabiliser (15) for a boat (24), comprising a strut (5) submerged in the water supporting at its end a first substantially horizontal submerged aileron (1), mounted able to rotate with respect to the submersible strut (5) according to a horizontal pivot (3), ***wherein*** the first aileron (1) comprises a trailing edge flap (7) jointed to rotate around an axis near to the trailing edge (21) of said aileron (1) and wherein said flap is controlled by a rotational drive mechanism with respect to said aileron (1) so as to orient said aileron.

2. A stabiliser according to Claim 1, wherein it comprises a second substantially vertical submerged aileron (2) that rotates around the submersible strut (5) and which comprises motor means so as to be oriented.

3. A stabiliser according to Claim 1, wherein it comprises a second substantially vertical aileron (2) able to rotate freely around the submersible strut (5) and comprising a trailing edge flap (8) jointed to rotate around an axis near to the trailing edge (22) of said second aileron (2), said flap (8) being controlled by a rotational drive mechanism with respect to the second aileron (2) so as to orient said second aileron (2).

4. A stabiliser according to one of Claims 1 to 3, wherein the submersible strut (5) comprises a streamlined fairing (6) able to rotate freely around said submersible strut so as to freely orient itself in the local flow direction of the water.

5. A stabiliser according to Claim 4, wherein return means (9), of the elastic or motor type, are positioned between the submersible strut (5) and the rotating streamlined fairing (6) so as to impose a restoring torque on said fairing when this fairing is angularly offset.

6. A stabiliser according to Claim 4 or 5, wherein the rotating streamlined fairing (6) comprises a hydrodynamic lift element (18) on its downstream side that is fixed with respect to said fairing or is able to be oriented in vertical rotation with respect to the fairing.

7. A stabilisation device for a boat (24) implementing at least one stabiliser (15) according to any one of the above Claims, wherein at least one stabiliser (15) is carried by a substantially horizontal arm (14) integral with the boat (24), said arm (14) being located above the water.

8. A stabilisation device for a boat according to Claim 7, wherein certain arms (14) are made integral with the boat (24) by a pivot type link (49) with several lockable positions so as to make them foldable.

9. A stabilisation device for a boat according to Claim 7, wherein certain arms (14) are constituted by several sections (14a, 14b) connected together by a pivot type link (12) with several lockable positions so as to make them foldable.

10. A stabilisation device for a boat according to any one of Claims 7 to 9, wherein certain submersible struts (5) are integral with an arm (14) by means of a pivot link (142) with a substantially horizontal axis able to be locked in several positions, a lowered position for said submersible struts when the orientable hydrodynamic ailerons (1, 2) are in use and a raised position for said submersible struts when said ailerons are not in use, the boat being immobile or moving at low speed.

11. A stabilisation device for a boat according to Claim 10, wherein the retention of certain submersible struts (5) in the lowered position is ensured by resistance locking calibrated for a force tending to push back said submersible struts, wherein said locking leaves said submersible struts able to rotate backwards and upwards when said limit resistance has been attained.

12. A stabilisation device for a boat according to one of Claims 7 to 11, wherein it comprises a calculator (43) cooperating with static and/or dynamic sensors (25) and piloting the orientation means of the aileron or ailerons (1, 2) so as to vary their orientation according to the movements of said boat.

13. A load compensation device to orient the sails (57, 59) of a boat or sailing craft, ***wherein it comprises***,

- firstly, a global elastic device (201) pressing on a fixed part (30) of the boat and comprising an output part (103, 92) able to move on a certain course, or a certain displacement, said mobile output part transmitting an elastic load whose intensity increases according to the amplitude of its displacement, said global elastic device being constituted by one or several elastic organs (37, 72) positioned between said fixed part of the boat and said mobile output part, the addition of the individual elastic loads of said elastic organs (37, 72) supplying the global elastic load to said mobile output part (103, 92) of said global elastic device (201),

- secondly, a device (200) to transmit the movement of said mobile output part (103, 92) of said global elastic device (201) to said sails (57), said movement transmission device changing its transmission ratio according to the angle of orientation of said sails (57) such that the elastic restoring torque which the device (200) exerts on said sails, tending to bring the mean plane of the latter parallel to the plane of symmetry of the boat, or sail craft, is of constant intensity, or else of slightly and gradually increasing intensity, when said sails (57) pivot from the orientation corresponding to the "close-hauled" point of sailing to that corresponding to the "following wind" point of sailing.

14. A device according to Claim 13, wherein the sail orientation organ is a sail (57, 59) sheet (56, 58) connected at one end to the sails and winding at the other around a drum (66) integral with or linked in rotation to a drum winch (69) with variable winding radius acting as the movement transmission device (200).

15. A device according to Claim 13, wherein the global elastic device (201) comprises means (86, 87) to adjust the mean elastic load enabling it to be adapted to the prediction, for a given lapse of time, of the mean orientation load of the sails (57).

16. A device according to any one of Claims 13 to 15, wherein it comprises means to adjust the sail (57)

orientation angle, and wherein said orientation angle adjustment means comprise a manual handling organ.

17. A device according to any one of Claims 13 to 15, wherein it comprises means to adjust the orientation of the sails (57) and wherein said means comprise an actuator controlled by a signal from a calculator (43) or from control means piloted by a member of the crew.

18. A device according to Claim 17, wherein it comprises bidirectional limitation means for the load, force or torque, communicated by the actuator to the sails (57).

19. A device according to any one of Claims 13 to 18, wherein the global elastic device (201) comprises one or several pneumatic or hydraulic jacks (72) linked by one or more lines (81) to one or more tanks (82) containing compressed gas.

20. A device according to Claim 19, wherein at least one tank (82) is connected by means of a valve (86, 87) to a source of pressure, depression or free air, so as to be able to modify the pressure present in said tank.

21. A device according to any one of Claims 13 to 20, wherein certain elastic organs (37, 72) of the global elastic device (201) may be suspended from use when navigating, either by the temporary uncoupling of their own elastic movement output organ (103, 92) with respect to the device (200) to transmit movement to the sails (57), or by the temporary uncoupling of their base (73) with respect to the boat structure to which said base is usually joined, or by the temporary neutralisation of their elastic properties, then brought back into use when navigating by re-coupling the elastic organs temporarily uncoupled or by re-establishing the elastic properties having been temporarily neutralised.

22. A device according to any one of Claims 13 to 21, wherein the movement transmission device (200) comprises at least two drums (66, 69) revolving freely around shafts fixed with respect to the boat, coupled in rotation, either directly, or by means of a constant or variable ratio transmission mechanism, drums onto which two opposite winding cables (56) and (71) are anchored one of which at least is

wound in a groove (70) of variable winding radius, the first cable (71) being linked directly or by means of tackle to the elastic movement output organ (103, 92) of the global elastic device (201), the second cable (56) being linked directly or by means of tackle to a point of the sails (57) enabling them to be oriented.

23. A device according to Claim 17 or 18, wherein the actuator is constituted by, or comprises, a rotating electric stepper motor.

24. A device according to Claim 17 or 18, wherein it comprises a load, force or torque amplifier, comprising at least one streamlined submerged blade with hydrodynamic lift, which may be oriented around a pivot parallel to its longitudinal axis, this pivot being mobile transversally to the current due to the displacement of the boat.

25. A device according to Claim 17 or 18, wherein the actuator of the compensation device is controlled by a calculator linked to sensors enabling the orientation of the wind direction and the sails (57) to be measured with respect to the boat.

26. A device according to any one of Claims 14 to 25, wherein substantially vertical stanchions (63) integral with the boat, surrounded by freely-turning cylindrical sleeves, are provided to intercept the passage of the sheet or sheets (56, 58) when they reach the fore part of the boat so as to reduce stressing on the global elastic device (201).

27. A boat comprising a platform (52), at least one main, completely submerged, streamlined float (51), integral with the platform (52) by one or more supporting pylons (16) which take up the full weight of the platform (52) to keep it out of the water, ***wherein it comprises:***

- arms (14) radiating out from the platform (52), which are substantially horizontal and which support submersible struts (5) extending into the water, fitted with submerged orientable ailerons (1, 2) with hydrodynamic lift effect, said arms (14) being located above the water,

- mobile streamlined fairings (6), freely rotating under the effect of the local current and individually enveloping each supporting pylon (16),

- at least three auxiliary closed-hull floats (53), watertight and streamlined, spaced around the platform (52) to ensure balanced trim when immobile or at low speed, integral with the radiating arms (14) or with the platform (52).

28. A boat according to Claim 27, wherein it comprises a stabilisation device according to one of Claims 7 to 12, provided by said radiating arms (14), said submersible struts (5), and said orientable ailerons (1, 2).

29. A boat according to Claim 27 or 28, wherein it comprises an adjustable preload device (500) enabling the boat's mass to be increased or decreased by means of ballasts (17) with adjustable water intake.

30. A boat according to one of Claims 27 to 29, wherein the submersible struts (5) extending into the water as well as certain auxiliary floats (53) are positioned near to the ends of radiating arms (14).

31. A boat according to any one of Claims 27 to 30, wherein at least one auxiliary float (53) is fixed to a radiating arm (14) by a link having several lockable positions thereby enabling this float (53) to be brought closer to the platform (52) when the craft is stopped or by a pivot type link with a substantially vertical hinge pin having several lockable positions.

32. A boat according to one of Claims 27 to 31, wherein it comprises means to measure the position, inclination, speed and/or acceleration, cooperating with a calculator (43) so as to determine the movements of the boat and model these movements as roll, pitch, yaw movements and/or alternating movements of the boat's centre of gravity due to the passage of the waves, constituted by the vertical movement of the centre of gravity (alternatively up and down) and the lateral movement of the centre of gravity (alternatively offsetting from port to starboard).

33. A boat according to Claim 32, wherein it comprises measurement means, such as anemovanes, sail orientation sensors, submerged vanes, pressure sensors (40), surface reflection sonars (34), surface probes, video cameras, or any other means cooperating with the calculator (43) so as to determine the wave movement upstream of each main submerged float (51), to model the movements of the water transversal to the path of the boat along the axis of each of said floats, these movements being broken down, for example, along two non parallel transversal axes, or to determine the aerodynamic efforts on those boat elements offering wind resistance.

34. A boat according to Claim 32 or 33, wherein the calculator (43) cooperates with the orientation means (1, 2) for the orientable ailerons so as to orient them according to the simulation of the boat's movements and/or the wave movements and/or the aerodynamic forces, to thereby provide stabilisation for the boat by controlling its trim and trajectory.

35. A boat according to any one of Claims 27 to 34, wherein certain orientable ailerons (1, 2) comprise an angular sensor which measures the angle of rotation of the ailerons (1, 2) with respect to the submersible strut (5) and cooperates with the calculator (43).

36. A boat according to any one of Claims 27 to 35, wherein it comprises a balancing device (501) with mobile masses permanently-adjustable by the lateral and/or longitudinal displacements of mobile counterweights along guides, positioned along such guides by mechanisms comprising actuators, or comprising a mass of water that can be transferred between distanced tanks (54), said balancing device (501) cooperating with the calculator (43) so as to modify the position of the boat's centre of gravity according to its movements and to the unbalancing effects due, for example, to the distribution of the payload or to the wind.

37. A boat according to Claim 36, wherein the balancing device (501) comprises tanks (54) located in the auxiliary floats (53) and partly filled with water, said tanks (54)

being connected together by piping (55) and at least one pump (11) cooperating with the calculator (43) so as to distribute the water among the tanks (54).

38. A boat according to any one of Claims 27 to 37, wherein each supporting pylon (16) located between a fully submerged main streamlined float (51) and the platform (52) is retractable, with several lockable positions, as well as the rotating fairing (6) surrounding it, in a housing in said platform.

39. A boat according to any one of Claims 27 to 38, comprising wind propulsion means, wherein the orientation of at least one wind propulsion means (57, 59) is ensured by a device according to any one of Claims 13 to 26.